Saskatchewan Agriculture and Food

Coriander in Saskatchewan

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Coriander (*Coriandrum sativum*) is an annual spice crop and a member of the Umbelliferae, or carrot family. It has an erect, branching stem growing to a height of approximately 0.6-1 m (2-3 ft.). The fresh green herb is called cilantro, or Chinese parsley. It is used in southeast and southern Asian, Chinese and Mexican cuisine, and for flavouring salads and soups.

The mature, round fruit contains two fused seeds. The market requires intact fruits, as the essential oil can volatilize from split fruit or individual seeds. Mature seeds have a pleasant, spicy aroma. Coriander powder is made from ground seeds and is used to flavour many products such as, curries, gin and prepared meats.

There are two types of coriander: large seeded (fruited) and small seeded. Large seeded coriander (seed diameter 3-5 mm) is grown as a spring crop in northern temperate climates like Saskatchewan, or as a winter crop in areas with a Mediterranean climate. The most common type grown in Saskatchewan is large seeded, which has an essential oil content of 0.5-1 per cent. It grows to a height of approximately 0.6 m (2 ft.), and has a growing season requirement of approximately 100-110 days.

Small seeded coriander is produced mainly in more moderate temperature zones. It has a longer growing season requirement of approximately 115-120 days. Small seeded coriander is somewhat taller, approximately one metre (three ft.), and contains more essential oil. Small seeded coriander grown in Saskatchewan has an essential oil content of 1-1.5 per cent. Volatile oils such as linalool are responsible for the aroma of coriander. The essential oil of coriander should contain 60-70 per cent linalool.

Immature seedlings of small seeded coriander (cilantro) are harvested as a spicy addition to salads or for flavouring of meats, soups and stews.

The 10-year average area of coriander planting in Saskatchewan is approximately 6,900 ha (17,000 ac.). The average yield of large seeded coriander in Saskatchewan is approximately 900 kg/ha (800 lb./ac.). Small seeded coriander yield can be slightly more, if growing conditions allow it to mature. The bushel weight of coriander is 22-25 lb. depending on quality.

Adaptation

Coriander is a heat loving crop. It can be grown on a fairly wide range of soils, but is best adapted to well drained loam and sandy loam soils. Coriander germinates very slowly, and may take as long as 21 days to emerge. It does not compete well with weeds, especially perennial weeds, and should be planted on clean land. Plants can suffer flower blast if very hot, dry conditions occur at bloom.

Coriander crops can be severely affected by blossom blight (see Disease Control.) Severe infections occur in cool, wet environmental conditions, or in fields where there is a recent history of coriander production. Coriander should not be planted in the same field more than once in four years to avoid losses due to plant diseases.

Varieties

Two Canadian coriander varieties have been developed by Dr. A.E. Slinkard, Professor Emeritus, Crop Development Centre (CDC), University of Saskatchewan. Promising coriander lines were screened for adaptation to Saskatchewan conditions and two cultivars were selected. Commercial seed supplies are now available for CDC Major (medium-large seeded) and CDC Minor (small seeded) coriander. Table1 contains the main seed characteristics of these two new varieties.

Table1. Main seed characteristics of coriander varieties

Cultivar	Yield Kg/ha	1,000 fruit weight (g)	Essential Oil %	Linalool % Of Essential Oil
CDC Major	2,030	8.9	0.91	65.6
CDC Minor	1,713	7.2	1.22	68.4

Seeding

The recommended seeding rate for large seeded coriander is 33 kg/ha (30 lb./ac.), and 18 kg/ha (16 lb./ac.) for the small-seeded coriander. This is approximately 36 fruits per metre of row in rows 15-17 cm apart. Each mature fruit contains two seeds. Research results indicate no yield differences between using intact or split fruits for planting. The recommended seeding depth is 2.5-4 cm (1-1½ in). Coriander requires a firm, moist seedbed to enhance germination and hasten plant emergence. Any seeding equipment that will provide these conditions is suitable.

Coriander should be seeded in late April to mid-May. Emergence may take 21 days or more. Seedlings have some tolerance to spring frost. Research results have indicated higher seed yields and oil levels can be achieved by seeding before May 20. Seeding into dry soil can delay germination.

Dormant fall seeding of coriander has been tested, with fall-seeded crops being harvested approximately two weeks earlier than spring-seeded crops. Results indicate that to avoid uptake of moisture and germination in the fall, seeding should take place just prior to, or at freeze up. Increasing the seeding rate does not appear to provide a yield advantage, however dormant fall seeded plots resulted in increased seed size. Dormant fall seeding can be recommended except in conditions of very dry soils.

Fertilization

Soil testing prior to seeding will provide a good assessment of soil nutrient levels and balance. Research indicates that coriander uses about 30 per cent less nitrogen than a canola crop. Soil nitrogen plus fertilizer nitrogen should be 55-75 kg/ha (50-70 lb./ac.) with the high end of the range best suited to moist growing conditions. However, field research results reveal very little yield response of coriander to the addition of nitrogen fertilizer, if soil test nitrogen levels exceed 40 kg/ha (36 lb./ac.). Since coriander has a small seed, the rates of seed-placed nitrogen fertilizer should not exceed those of canola under good to excellent soil moisture conditions. It is recommended that seed placed phosphate fertilizer not exceed 22 kg/ha (20 lb./ac.) actual P2O5 with 2.5 cm (1 in.) spread and 15-17.5 cm (6-7 in.) row spacing, under good to excellent soil moisture conditions.
For more information on fertilizers and their application, refer to Saskatchewan Agriculture and Food (SAF) publication Guidelines for Safe Rates of Fertilizer Applied with the Seed.

Weed Control

Coriander may take 21 days to emerge after planting, and does not compete well with weeds. Severe weed competition can occur unless the crop is seeded in clean fields. Some producers use a post planting application of glyphosate to control grassy and broadleaf weeds in the time period between planting and emergence of the coriander. Control of perennial weeds in the crop is very difficult and is best done in the year prior to planting coriander with a pre-harvest glyphosate treatment. EDGE® herbicide is registered for use in coriander to control annual grassy and some annual broadleaf weeds. POAST ULTRA® and CENTURION® herbicides are registered in coriander for the control of annual grassy weeds. LOROX® is registered for post-emergence control of some annual broadleaf weeds in coriander. For more information on weed control and herbicides consult the SAF publication Guide to Crop Protection, or the product label.

Insect Control

DIPEL® 2X DF (*Bacillus thuringiensis*) biological insecticide is registered for the control of certain insects on coriander. Check the label for more information. Grasshoppers are an insect pest in coriander as their heads and other body parts can contaminate the grain sample and cause downgrading or rejection. Leaf hoppers can also be of economic importance because they can spread aster yellows disease.

Disease Control

Several commonly occurring root diseases, such as damping off and seedling rot, can infect coriander seedlings. Symptoms include yellowing and death of newly emerged seedlings. It is important to use clean seed to reduce the risk of seedling diseases. Crop rotations, which provide a break from other members of the carrot family for several years, will help to prevent the build up of disease. MAXIM® 480 FS is a registered seed treatment for control of seed-borne and soil-borne seedling diseases on coriander cause by Fusarium and Rhizoctonia.

Aster yellows is a viral-like plant disease, which commonly infects members of the carrot family and other crops such as canola and Echinacea. Caraway and dill are more susceptible than coriander. The disease causes yellowing of infected plants and flower parts become malformed. Infected plants will often be taller than unaffected plants and will not set seed. The disease is spread from infected to healthy plants by leaf hoppers, which are small sap-feeding insects. Aster yellows over winter in crowns of biennial or perennial weeds or crops, and is not seed-borne or soil-borne. No crop protection products are registered for the control of aster yellows in coriander. Choose crop rotations that avoid planting near or into fields with perennial crops that may harbour the disease. For more information on aster yellows consult the SAF publication *Aster Yellows* available on the SAF website.

Figure 1. Flower blight in coriander.

Coriander and caraway crops can be attacked by blossom blight. Symptoms include emerging flowers that turn brown and black (Figure 1) on plants that otherwise appear normal. Flowers continue to die as they emerge and very little seed is produced in infected areas. Infected patches soon expand to the whole field if environmental conditions remain cool and wet.

The most important cause of blossom blight in coriander is a fungus Aureobasidium sp. The most important cause of blossom blight in caraway is an Ascochyta sp. These two fungal organisms can be found on coriander and caraway blossom blight as

well as additional fungi: Fusarium avenaceum, F. poae, F. culmorum, F. equiseti, F. sporotrichioides, F. graminearum, Botrytis cinerea, Sclerotinia sclerotiorum, and Alternaria spp.

Producers are advised to use the best seed available and maintain crop rotations, which include coriander or caraway no more frequently than one in four years. Research is underway to determine potential methods of disease prevention and control. For more information on blossom blight of coriander consult the SAF publication Blight Disease of Coriander and Caraway in Saskatchewan available on the SAF website. Quadris® foliar fungicide is registered for the control of blossom blight on coriander. Consult the SAF publication Guide to Crop Protection, or the product label for more information.

Coriander is susceptible to white mould or sclerotinia, a disease causing stem rot in many broadleaved crops including canola and pea. This disease can cause stem rot, breakage and yield loss. Do not plant coriander on canola stubble and use good agronomic practices such as balanced fertility and weed control. Sclerotinia will likely only be a concern in wet years or in areas with canola and pea production.

Sooty mould is a fungal disease complex which may develop on the stems and fruits of nearly mature crops that have been damaged by hail, wind or heavy rain. These moulds cause discolouration of the sample. The crop should be harvested as soon as possible to prevent deterioration in the field. An additional source of information is the publication Diseases of Field Crops in Canada available from the University Extension Press, University of Saskatchewan (phone 1-306 966-5565).

Harvesting

Straight combining when the crop is fully mature is the preferred harvest method for coriander. The crop can be swathed when the fruit turns tan to brown. However, large and fluffy swaths can be very susceptible to wind damage. Swathing or combining in damp weather or when dew is present will help to avoid shattering losses.

Combine when the moisture content is less than 15 per cent. A moisture content of 10 per cent is considered dry, but many buyers prefer a moisture content of nine per cent. Cylinder or rotor speed should be set to approximately 500 RPM under dry conditions. An initial concave setting of 12 mm (½ in.) at the front, and 8 mm (¼ in.) at the back is suggested. Wind speed should be set high enough to reduce dockage, and the return should be minimized as much as possible. Reduced ground speed may be required. Coriander containing over five per cent split fruit is usually discounted at time of purchase.

Storage

Some producers use a moisture meter to determine moisture levels in coriander samples. For 10 per cent moisture on a 3.5" moisture meter, use the sunflower chart; a 150 g sample; and calibrate @73.

The microwave oven technique can also be used to determine the moisture content of seed samples. Weigh 100 g of seed and place in microwave for 30-second intervals. Weigh the seeds between each interval. Repeat until the seed weight becomes constant after three intervals.

% Seed moisture content = 100 g - weight of seed after drying (g) x 100 / weight of seed after drying (g)

Coriander seed must cure during storage. Natural air drying or aeration is beneficial for curing. Coriander oil is very volatile and hot air drying should be avoided. Green material should be cleaned from the sample as soon as possible. Avoid the concentration of green material such as weed seeds in the bin. The higher density of the green material prevents even airflow during aeration and increased spoilage can occur. The sample must be free of foreign material at the time of sale.

Processing and Grading

A high percentage of clean-out often occurs during cleaning, and dockage levels can reach 15-30 per cent. A number of special crop processors in Saskatchewan clean and bag coriander.

Commercial essential oil steam distillation processing of coriander seed has taken place in Saskatchewan. The Prairie Agricultural Machinery Institute (PAMI) operates a prototype-scale plant at their facility in Humboldt, SK. For more information call PAMI at 1-306-682-2555. At the time of writing this fact sheet, commercial steam distillation of coriander was not occurring.

Grading standards for coriander are determined by the buyer. Coriander is graded by the buyer according to its aroma and appearance. Factors such as colour, stems, splits, and foreign material are taken into account. Buyers prefer a light tan colour with at least 99.5 per cent pure whole seed. Often buyers request the product be cleaned to the standards set by the American Spice Trade Association.

Marketing

Several special crop marketing companies offer production contracts for coriander and purchase coriander. The SAF publication Saskatchewan Special

Crop Marketing Company Synopsis provides a list of companies buying and contracting special crops.

The end use market for coriander exists mainly in the large urban centres of North America. Canada also exports coriander seed to Japan, Trinidad, and United Kingdom. Prices are often based FOB New York, cleaned and bagged. Farm-gate prices for cleaned coriander in recent years have ranged from CDN 35-72¢/kg (16-33¢/lb.).

Competitors to Canada for the export of coriander are Morocco, Romania, Bulgaria, Argentina and India. Moroccan coriander is often priced at a discount. Production in Canada should focus on high quality and consistent seed size to compete in export markets.

Economics of Production

The SAF publication Crop Planning Guide-Specialty Crops provides annually updated estimates of the costs of production and expected returns for coriander.

Additional Information

Saskatchewan Herb and Spice Association
Website address: http://www.saskherbspice.org/
The Grower's Guide to Herbs and Spices

Saskatchewan Agriculture and Food

- Agriculture Knowledge Centre 1 866 457- 2377
- Website address: http://www.agr.gov.sk.ca/
- Blight Disease of Coriander and Caraway in Saskatchewan
- Aster Yellows
- Guidelines for Safe Rates of Fertilizer Applied with the Seed
- Specialty Crop Report
- Saskatchewan Special Crop Marketing Company Synopsis
- Crop Planning Guide - Specialty Crops
- Guide to Crop Protection
  Diseases of Field Crops in Canada, available from the University Extension Press, University of Saskatchewan at 1-306-966-5565.

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